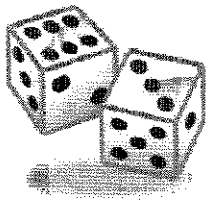
CONSTRUCTING TASK: SHAKE, RATTLE, AND ROLL



CONTENT STANDARDS ADDRESSED

MCC.3.NBT.2 Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

MCC.3.NBT.1 Use place value understanding to round whole numbers to the nearest 10 or 100.

STANDARDS FOR MATHEMATICAL PRACTICE

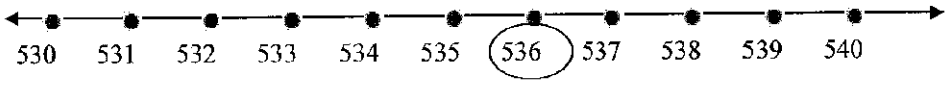
1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

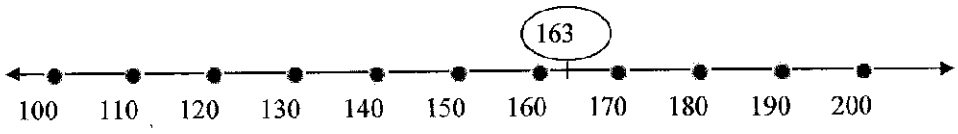
This task is designed to develop addition practice, mental math, and estimation skills. It will also provide exposure to rounding concepts. You may want to use a book similar to *Mental Math in the Primary Grades* by Jack Hope, R. Reys, Larry Leutizinger, Barbara Reys, and Robert Reys to practice mental math with the class as a whole group.

Use all available opportunities during the day to incorporate the use of estimation and rounding, for example, determining to which multiple of 10 or 100 a given number is nearest. This skill can be supported with the use of a number line 0-99 chart and/or a hundreds chart. Students should have these tools available for this task. Alternatively, students can create a number line to determine the closest multiple of ten. A student sheet with open number lines could be provided. An example of an open number line is shown below.

For the number 536, students can fill in the numbers around 536, including the two closest multiples of ten as shown below. Then looking at the number line, students can determine the nearest multiple of ten that is the closest to 536. In this case, 540 is 4 away, but 530 is 6 away, so 540 is the closest multiple of ten.



For the number 163, students can follow a similar procedure to round to the nearest hundred. Students will need to determine the multiple of one hundred that is the closest to 163. In this case 100 is more than 60 away, but 200 is less than 40 away, so 200 is the closest multiple of one hundred.



Rounding skills will help students determine reasonableness of answers, a vital skill for standardized tests, as well as everyday living. If you incorporate calendar activities into your instruction, many opportunities present themselves for activities with rounding. Also, be sure students make connections between the following:

- Counting by multiples of ten and hundred
- Multiplying by multiples of ten.
- Estimating to the nearest ten and hundred before adding or multiplying.

Students should be proficient in determining to which multiple of ten or hundred any given number is nearest. They should also be comfortable adding multiples of ten, hundred, and thousand (For example, 200 + 600 = 800).

ESSENTIAL QUESTIONS

- What strategies can I use to help me add in my mind more quickly and efficiently?
- What is an effective way to round numbers to the nearest hundred?
- How can estimation strategies help us build our addition skills?
- When can estimating be helpful to us?

MATERIALS

- Two six-sided dice
- Calculator
- "Shake, Rattle, and Roll" Recording Sheet

GROUPING

Partner/Small Group Task

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

In this task, students play a game with dice that enables them to build estimation and mental math concepts as they practice addition skills and strategies and determine to which multiple of one hundred a given number is nearest.

Task Directions

Students will follow the directions below from the "Shake, Rattle and Roll" Recording Sheet.

This is a two player game that will help you practice your estimation and addition skills. The goal of the game is to be the person with the most points at the end of ten turns.

Directions:

1. Play with a partner. You will need 3 dice, a recording sheet for each player, and a calculator.
2. Player one rolls the three dice and forms two numbers, the largest possible number and the smallest possible number, as shown below.

Using the digits 5, 4, and 4 make the numbers 544 and 445. Find the nearest multiple of 100 for each number, and then using mental math, add to find an estimate.

Estimated sum = 500 + 400 = 900

3. Player one records the estimate on the game recording sheet to end round 1. Your partner must agree with your estimation, using a calculator to check if needed.
4. Player two takes a turn, following steps 2 and 3 above.
5. Players take turns for a total of six rounds.
6. After six rounds, each player finds the sum of their estimates. The player with the higher sum wins the game.

FORMATIVE ASSESSMENT QUESTIONS

- Explain how you found the closest multiple of one hundred.
- Do you think your estimated sum is higher or lower than the actual sum? Why? How could you check?
- What kinds of situations in life might be easier if you knew how to estimate and add numbers like this?

DIFFERENTIATION

Extension

- Ask students to play the game again, estimating to the tens place. Does that change the game? If so, how?

- Play the game with four dice. Students get to choose three of the numbers rolled (or two as an intervention) and players have to get closest to 3000. Whoever is closest (over or under 3000) wins the game. This changes the strategy and allows opportunities for teachers to ask students what they hope to roll on the last roll based on what they have so far.

Intervention

- Use number lines, number charts, and models to help students who are having difficulty determining to which multiple of hundred their number is nearest. Use counting up/counting back to the nearest multiple of hundred and compare the results to determine which multiple of hundred a number is closest.
- Students can play the game using fewer dice, adjusting the game accordingly. Once students become comfortable with fewer dice, they can challenge themselves by playing the game with the required three dice.

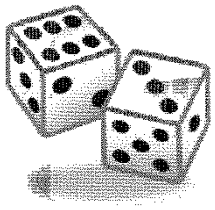
TECHNOLOGY CONNECTION

- http://www.shodor.org/interactivate/activities/EstimatorFour/?version=1.6.0_02&browser=MSIE&vendor=Sun_Microsystems_Inc. A "Four in a Row" game where players get checkers when they quickly and efficiently estimate a sum to two numbers.
- http://www.oswego.org/ocsd-web/games/Estimate/estimate.html Students estimate the number indicated on a number line.

Name _____ Date _____

Shake, Rattle, and Roll

Game Directions



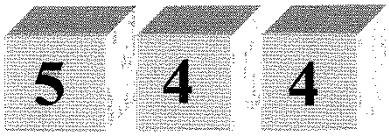
This is a two player game that will help you build your estimation and mental math concepts as you practice addition skills and strategies. The goal of the game is to be the person with the most points at the end of ten turns.

Directions:

1. Play with a partner. You will need 3 dice, a recording sheet for each player, and a calculator.

2. Player one rolls the three dice and forms two numbers, the largest possible number and the smallest possible number, as shown below.

Example:



Using the digits 5, 4, and 4 make the numbers 544 and 144. Find the nearest multiple of 100 for each number, and then using mental math, add to find an estimate.

Estimated sum = 500 + 400 = 900

3. Player one records the estimate on the game recording sheet to end round 1. Your partner must agree with your estimation, using a calculator to check if needed.

4. Player two takes a turn, following steps 2 and 3 above.

5. Players take turns for a total of six rounds.

6. After six rounds, each player finds the sum of their estimates. The player with the higher sum wins the game.

Shake, Rattle, and Roll Game

Player 1

Round	Dice Numbers			Smallest Number		Largest Number		Estimated Sum
	Die 1	Die 2	Die 3	Actual	Nearest Multiple of 100	Actual	Nearest Multiple of 100	
1								
2								
3								
4								
5								
6								
							Total	

Shake, Rattle, and Roll Game

Player 2

Round	Dice Numbers			Smallest Number		Largest Number		Estimated Sum
	Die 1	Die 2	Die 3	Actual	Nearest Multiple of 100	Actual	Nearest Multiple of 100	
1								
2								
3								
4								
5								
6								
								Total